MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

BMP2014 – MATHEMATICAL PROGRAMMING

(All sections / Groups)

22 OCTOBER 2016
2.30 p.m – 4.30 p.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **FOUR (4)** printed pages including cover page.
2. Answer **ALL FOUR (4)** questions.
3. Please write all your answers in the Answer Booklet provided.

QUESTION 1 (25 MARKS)

(a) XYZ Company produces window (x_1) and door (x_2) frames. Each window frame requires four hours of assembly and two hours of finishing. One door frame requires two hours of assembly and three hours of finishing. The company has available 60 hours of assembling time and 48 hours of finishing time. The company can sell all the frames that are produced. The profit of each window and door frame are RM50 and RM40, respectively.

(i) Solve the above problem graphically to obtain the number of each product that should be produced weekly as to maximize profit.

(13 marks)

(b) Solve the LP model below using Simplex method:

$$\text{Minimize } C = 2x_1 - 3x_2$$
$$\text{Subject to:}$$
$$x_1 + x_2 \leq 4$$
$$x_1 - x_2 \leq 6$$
$$x_1, x_2 \geq 0$$

(12 marks)

QUESTION 2 (25 MARKS)

State the alternative optimal solution using Simplex method for the following LP problem:

$$\text{Maximize } Z = 60x_1 + 30x_2 + 20x_3$$
$$\text{Subject to:}$$
$$8x_1 + 6x_2 + x_3 \leq 48$$
$$4x_1 + 2x_2 + 1.5x_3 \leq 20$$
$$2x_1 + 1.5x_2 + 0.5x_3 \leq 8$$
$$x_1, x_2, x_3 \geq 0$$

Continued...

QUESTION 3 (25 MARKS)

(a)

$$\text{Minimize } C = 3x_1$$
$$\text{Subject to:}$$
$$2x_1 + x_2 \geq 6$$
$$3x_1 + 2x_2 = 4$$
$$x_1, x_2 \geq 0$$

(i) Find an optimal solution using Two Phase Simplex Method.

(10 marks)

(ii) Write the dual of original LP Problem.

(4 marks)

(b) Find the optimal solution to the following problem using Golden Section Search within an interval of 0.8.

$$\text{Maximize} \quad Z = x^2 + 2x$$
$$\text{Subject to} \quad -3 \leq x \leq 5$$

(11 marks)

QUESTION 4 (25 MARKS)

(a) Mr. Del Potro needs to assign 4 jobs to 4 workers. The cost of performing a job is function of the skills of the workers. The following table summarizes that cost of the assignments. Determine the optimal assignment using the Hungarian Method.

Job	Worker 1	Worker 2	Worker 3	Worker 4
1	\$15	\$17	\$24	\$16
2	\$10	\$15	\$12	\$13
3	\$17	\$19	\$18	\$16
4	\$13	\$20	\$16	\$14

(8 marks)

(b) Fereded Company ships truckloads of maize from three factories to four states. The supply and demand (in truckloads) and the unit transportation costs (in hundreds of dollars) per truckload are summarized in the transportation model in the table below:

Continued...

Factory	State 1	State 2	State 3	State 4	Supply
1	10	2	20	11	15
2	12	7	9	20	25
3	4	14	16	18	10
Demand	5	15	15	15	

Compare the basic feasible solution obtained by Northwest Corner Method and Vogel Method. Compare of the results obtained and state your conclusion of the findings.

(17 marks)

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